WHAT IS CLAIMED IS:

1. A system for producing electrons and soft ions comprising:

an ionization device having:

an insulating element having at least one opening;

a first conductive electrode extending on a first surface of said insulating element in or near the at the at least one opening;

a second conductive electrode extending on a second surface of said insulating element in or near the at the at least one opening; and

wherein said insulating element separates said first and second conductive electrodes at the at least one opening by a width of said insulating element which is less than the mean-free-path of molecules being ionized; and

an electric potential generation unit coupled to said ionization device for applying a potential difference between said first and second conductive electrodes to generate an ionization field within the at least one opening to ionize molecules passing therethrough to produce a stream of ionized molecules and an electron stream.

2. The system of claim 1 wherein said ionization devices ionize all molecules passing therethrough below a pre-determined ionization potential.

3. The system of claim 1 further comprising a substrate having at least one opening corresponding to the at least one opening of said insulating element for structurally supporting said insulating element.

4. The system of claim 1 further comprising a detection unit coupled to said ionization device disposed to detect ionized molecules or electrons generated by said ionization device.

5. The system of claim 4 wherein the detection unit is a cathode or an anode.

6. The system of claim 4 wherein the dimensions of said ionization device and said detection unit are less than 1 mm by 1 mm.

7. The system of claim 5 wherein said cathode is a Faraday Cup or a conductive element.

8. The system of claim 5 wherein said cathode is configured to attract and neutralize ionized molecules generated by said ionization device and to detect the current of the neutralized ionized molecules.

9. The system of claim 8 further comprising a quantitation unit coupled to said cathode for quantitating the number of molecules based on the detected current from the neutralized ionized molecules.

10. The system of claim 8 further comprising a quantitation unit coupled to said cathode for quantitating the number of molecules having an ionization potential less than or equal to a pre-determined value.

11. The system of claim 10 wherein said quantitation unit may differentially detect ionized molecules having different valency levels.

12. The system of claim 10 wherein the ionization fields generated by said ionization device may be increased to a first value corresponding to a first ionization potential so that the detection unit may measure the number of ionized molecules having an ionization potential less than or equal to the first ionization potential.

13. The system of claim 12 wherein the ionization fields generated by said ionization device may be increased from the first value to a second value corresponding to a second ionization potential so that the cathode detection unit may measure the number of ionized molecules having an ionization potential less than or equal to the second ionization potential, and greater than the first ionization potential.

14. The system of claim 13 wherein said cathode detection unit is a mass spectrometer for differentiating the ionized molecules according to their respective masses, and further comprising an accelerating grid disposed between said ionization device and the mass spectrometer for generating electric fields to accelerate ionized molecules from said ionization device to the mass spectrometer.

15. The system of claim 14 wherein said cathode detection unit is an ion mobility spectrometer for differentiating the ionized molecules according to their mobility, and further comprising an accelerating grid disposed between said ionization device and the mass spectrometer for generating electric fields to accelerate ionized molecules from said ionization device to the ion mobility spectrometer.

16. The system of claim 5 wherein said anode is a Faraday Cup or a conductive element.

17. The system of claim 16 wherein said anode is configured to attract substantially all electrons generated by said ionization device and to detect the current of the attracted electrons.

18. The system of claim 17 further comprising a quantitation unit coupled to said anode for quantitating the number of electrons stripped from ionized molecules based on the detected electron current.

19. The system of claim 17 further comprising a quantitation unit coupled to said anode for quantitating the number of electrons stripped from ionized molecules having an ionization potential less than or equal to a pre-determined value.

20. The system of claim 19 wherein said quantitation unit identifies ionized molecules having different valency levels.

21. The system of claim 19 wherein the ionization fields generated by said ionization device may be increased to a first value corresponding to a first ionization potential so that the anode detection unit may measure the number of electrons stripped from ionized molecules having an ionization potential less than or equal to the first ionization potential.

22. The system of claim 21 wherein the ionization fields generated by said ionization device may be increased from the first value to a second value corresponding to a second ionization potential so that the anode detection unit may measure the number of electrons stripped from ionized molecules having an ionization potential less than or equal to the second ionization potential, and greater than the first ionization potential.

23. The system of claim 1 further comprising:

a cathode detection unit coupled to said ionization device disposed to detect ionized molecules generated by said ionization device; and

an anode detection unit coupled to said ionization device disposed to detect electrons stripped from the ionized molecules generated by said ionization device.

24. The system of claim 23 wherein said cathode detection unit is a Faraday Cup or a conductive element.

25. The system of claim 23 wherein said cathode detection unit is configured to attract and neutralize ionized molecules generated by said ionization device and to detect the current of the neutralized ionized molecules.

26. The system of claim 25 further comprising a quantitation unit coupled to said cathode detection unit for quantitating the number of ionized molecules based on the detected current from the neutralized ionized molecules.

27. The system of claim 25 further comprising a quantitation unit coupled to said cathode detection unit for quantitating the number of ionized molecules having an ionization potential less than or equal to a pre-determined value.

28. The system of claim 27 wherein said quantitation unit may differentially detect ionized molecules having different valency levels.

29. The system of claim 23 wherein said anode detection unit is a Faraday Cup or a conductive element.

30. The system of claim 29 wherein said anode detection unit is configured to attract substantially all electrons generated by said ionization device and to detect the current of the attracted electrons.

31. The system of claim 30 further comprising a quantitation unit coupled to said anode detection unit for quantitating the number of electrons stripped from the ionized molecules based on the detected electron current.

32. The system of claim 30 further comprising a quantitation unit coupled to said anode detection unit for quantitating the number of electrons stripped from ionized molecules having an ionization potential less than or equal to a pre-determined value.

33. The system of claim 32 wherein said quantitation unit identifies ionized molecules having different valency levels.

34. The system of claim 23 said cathode detection unit is a mass spectrometer for differentiating the ionized molecules according to their respective masses, and further comprising:

an accelerating grid disposed between said ionization device and the mass spectrometer for generating electric fields to accelerate ionized molecules from said ionization device to the mass spectrometer.; and

a quantitation unit coupled to said anode detection unit for quantitating the number of electrons stripped from the ionized molecules based on the detected electron current

35. The system of claim 23 wherein said cathode detection unit is an ion mobility spectrometer for differentiating the ionized molecules according to their mobility, and further comprising:

an accelerating grid disposed between said ionization device and the mass spectrometer for generating electric fields to accelerate ionized molecules from said ionization device to the ion mobility spectrometer; and

a quantitation unit coupled to said anode detection unit for quantitating the number of electrons stripped from the ionized molecules based on the detected electron current

36. The system of claim 23 wherein the ionization fields generated by said ionization device may be increased to a first value corresponding to a first ionization potential so that the cathode detection unit may measure the number of ionized molecules having an ionization potential less than or equal to the first ionization potential; and wherein the ionization fields generated by said ionization device may be increased from the first value to a second value corresponding to a second ionization potential so that the cathode detection unit may measure the number of ionized molecules having an ionization potential less than or equal to the second ionization potential and greater than the first ionization potential.

37. The system of claim 23 wherein the ionization fields generated by said ionization device may be increased to a first value corresponding to a first ionization potential so that the anode detection unit may measure the number of electrons stripped from ionized molecules having an ionization potential less than or equal to the first ionization potential; and wherein the ionization fields generated by said ionization device may be increased from the first value to a second value corresponding to a second ionization potential so that the anode detection unit may measure the number of electrons stripped from ionized molecules having an ionization potential less than or equal to the second ionization potential, and greater than the first ionization potential.

38. The system of claim 4 wherein the ionization fields generated by said ionization device may be incrementally increased to selectively ionize molecules having different ionization potentials.

39. The system of claim 38 wherein the ionization device may selectively ionize molecules based on valency level.

40. The system of claim 4 further comprising: a plurality of inlets segregating the at least one opening and configured to supply a different sample to each segregated opening on said ionization device.

41. The system of claim 40 wherein said detection unit comprises a plurality of spectrometers aligned with each of the at least one opening for detecting the segregated ionized molecules.

42. The system of claim 1 wherein the plurality of spectrometers are ion mobility spectrometers or mass spectrometers.

43. The system of claim 40 wherein said detection unit comprises a plurality of anodes aligned with each of the at least one opening for detecting electrons stripped from the segregated ionized molecules.

44. The system of claim 41 wherein said detection unit further comprises a plurality of anodes aligned with each of the at least one opening for detecting the electrons stripped from the segregated ionized molecules.

45. The system of claim 41 wherein said first and second conductive electrodes are separated by less than 1 micron at the at least one opening.

46. The system of claim 45 wherein said first and second conductive electrodes are separated by less than 300 nm at the at least one opening.

47. The system of claim 46 wherein said first and second conductive electrodes are separated by less than 200 nm at the at least one opening.

48. The system of claim 47 wherein said first and second conductive electrodes are separated by approximately 50 nm at the at least one opening.

49. A system comprising:

an ionization device having:

a first conductive electrode extending on a first surface of said insulating element;

a second conductive electrode extending on a second surface of said element;

wherein said insulating element separates said first and second conductive electrodes at the at least one opening by a width of said insulating element; and

wherein the width of said insulating element separating said first and said second conductive electrodes having portions disposed to be less than the mean-free-path of molecules being ionized; and

at least one ion delivery unit coupled to said ionization device for selectively dispersing ionized molecules having a pre-determined mass charge; and

at least one reactor coupled to said ion delivery unit configured to receive the selectively dispersed ionized molecules from said ion delivery unit for molecular interactions.

50. The system of claim 49 further comprising

a plurality of inlets segregating the at least one opening and configured to supply a different sample to each segregated opening on said ionizing membrane.

51. The system of claim 50 wherein at least two ion delivery units selectively deliver ionized molecules from segregated samples into said at least one reactor.

52. An ionization method comprising the steps of:

utilizing an insulating element having at least one opening;

extending a first conductive electrode on a first surface of said insulating element at the at least one opening;

extending a second conductive electrode on a second surface of said insulating element at the at least one opening;

separating said first and second conductive electrodes at the at least one opening by a width of said insulating element;

making said width of insulating element equal to or less than the mean free path at ambient temperature and pressure of material being ionized;

coupling a detector to said ionizing device for characterizing molecules by their ionization potential;

applying an electric potential across said first and second conductive electrodes to generate ionization fields;

increasing the electric potential across said first and second conductive electrodes said ionization fields to a first ionization potential to ionize all molecules with an ionization potential less than or equal to the first value;

detecting the ionized molecules having an ionization potential less than or equal to the first value;

increasing the electric potential across said first and second conductive electrodes said ionization fields to a second ionization potential to ionize all molecules with a ionization potential less than or equal to the second value; and

detecting the ionized molecules having an ionization potential less than or equal to the second value.

53. The method of claim 52 wherein the ionization fields impart minimal additional kinetic energy to the ionized molecules.

54. The method of claim 52 further comprising the step of providing an electric field wherein the ionized molecules and the electrons stripped therefrom are moved, in opposite directions away from the at least one opening.

55. The method of claim 54 further comprising the step of diverting the ionized molecules to generate an ion source.

56. The method of claim 54 further comprising the step of diverting the electrons to generate an electron source.

57. The method of claim 52 wherein the ionized molecules or electrons are identified using a cathode or an anode.

58. The method of claim 57 wherein said cathode is a Faraday Cup or a conductive element.

59. The method of claim 57 further comprising the steps of:

disposing said cathode to attract and neutralize all ionized molecules;

detecting the current from the neutralized ionized molecules; and

correlating the detected current of neutralized ionized molecules to determine the number of ionized molecules.

60. The method of claim 57 wherein said anode is a Faraday Cup or a conductive element.

61. The method of claim 60 further comprising the steps of:

disposing said anode to attract electrons stripped from the ionized molecules;

detecting the current from electrons stripped from the ionized molecules; and

correlating the detected current of electrons stripped from ionized molecules to determine the number of electrons stripped from ionized molecules.

62. A method for generating ions and electrons comprising the steps of:

producing soft ions using an ionization device, further comprising the steps of:

utilizing an insulating element having at least one opening;

extending a first conductive electrode on a first surface of said insulating element in or near the at least one opening;

extending a second conductive electrode on a second surface of said insulating element in or near the at least one opening;

separating said first and second conductive electrodes with the insulating element at the at least one opening;

separating said first and second conductive electrodes by a width of said insulating element;

making said width of insulating element equal to or less than the mean free path at ambient temperature and pressure of material being ionized;

applying a potential across the first and second conductive electrodes to generate ionization fields;

coupling a detector to said ionizing device for identifying ionized molecules having an ionization potential less than or equal to a pre-determined value;

increasing the ionization fields in small increments;

ionizing all molecules with an ionization potential equal or below the ionization field strength; and

configuring said ionizing device to ionize molecules passing therethrough below a specific ionization potential while imparting minimal additional kinetic energy to the ionized molecules;

providing an electric field wherein ions and electrons are moved, in opposite directions, out of an ionization volume within the at least one opening;

diverting the ions to generate an ion source; and

diverting the electrons to generate an electron source.

63. The method of claim 62 further comprising the steps of:

increasing the strength of the ionization fields from zero to a first value, wherein the first value is selected to correspond to a value wherein molecules having an ionization potential below a certain level are ionized;

measuring the number of electrons stripped from the ionized molecules having an ionization potential less than or equal to the first value utilizing an anode electrode;

increasing the strength of the ionization fields from the first value to a second value, wherein the second value is selected to correspond to a value wherein molecules having an ionization potential higher than the first value but less than or equal to the second value are ionized; and

measuring the number of electrons stripped from the ionized molecules having an ionization potential less than or equal to the second value but higher than the first value utilizing the anode electrode.

64. The method of claim 63 further comprising the steps of:

measuring the number ionized molecules having an ionization potential less than or equal to the first value utilizing a cathode; and

measuring the number of ionized molecules having an ionization potential less than or equal to the second value but higher than the first value utilizing the cathode.

65. The method of claim 62 further comprising the steps of:

increasing the strength of the ionization fields from zero to a first value, wherein the first value is selected to correspond to a value wherein molecules having an ionization potential below a certain level are ionized;

measuring the number ionized molecules having an ionization potential less than or equal to the first value utilizing a cathode;

increasing the strength of the ionization fields from the first value to a second value, wherein the second value is selected to correspond to a value wherein molecules having an ionization potential higher than the first value but less than or equal to the second value are ionized; and

measuring the number of ionized molecules having an ionization potential less than or equal to the second value but higher than the first value utilizing the cathode.

66. The method of claim 62 further comprising the steps of:

accelerating ionized molecules utilizing an electric field element for characterization by a mass spectrometer; and

differentiating the ionized molecules by mass utilizing a detector configured as a mass spectrometer.

67. The method of claim 62 further comprising the steps of:

accelerating ionized molecules utilizing an electric field element for characterization by the ion mobility spectrometer; and

differentiating the ionized molecules by mobility utilizing a detector configured as an ion mobility spectrometer.

68. The method of claim 62 wherein the ionized molecules are selectively diverted for use by at least one reactor.

69. The method of claim 68 wherein multiple samples of molecules are ionized in parallel and are diverted for use by the at least one reactor.

69. The method of claim 62 wherein the ionized molecules are accelerated by fringe fields of the ionization fields.

70. A spectrometer comprising:

an ionization device having:

an insulator having at least one opening;

a first conductive electrode extending on a first surface of said insulator at or near the at least one opening;

a second conductive electrode extending on a second surface of said insulator at or near the at least one opening;

wherein the insulating element separates said first and second conductive electrodes at the at least one opening by a width of said insulating element; and

wherein the width of said insulating element separating said first and said second conductive electrodes having portions disposed to be less than the mean-free-path of molecules being ionized;

means coupled to said first and second electrode for selectively generating ionization fields to ionize all molecules having an ionization potential less than or equal to the ionization field strength; and

detection means for quantitating the number of ionized molecules.

71. A system for producing electrons and ions comprising:

ionization means having:

an insulating element having at least one opening;

a first conductive electrode extending on a first surface of said insulating element in or near the at the at least one opening;

a second conductive electrode extending on a second surface of said insulating element in or near the at the at least one opening; and

wherein said insulating element separates said first and second conductive electrodes at the at least one opening by a width of said insulating element which is less than the mean-free-path of molecules being ionized; and

electric potential generation means for applying a potential difference between said first and second conductive electrodes to generate an ionization field within the at least one opening to ionize molecules passing therethrough to produce ions and electrons.

cathode means coupled to said ionization means for quantifying the ions; and

anode means coupled to said ionization means for quantifying electrons.

72. The system of claim 71 further comprising:

separation means for supplying one or more samples to the at least one opening.

73. The system of claim 72 further comprising:

reactor means for receiving ions for molecular reactions.